AP Chemistry
Solution Chemistry Practice Problems

Name: _____ Date: _____ Period: _____

1. Consider a 1.00L solution containing 85.5g $Al_2(SO_4)_3$ (FW = 342.15) and 21.3g Na_2SO_4 (FW = 142.06). What are the molar concentrations of the aluminum, sodium and sulfate ions?

2. Is the total ionic equation the same as the net ionic equation for the reaction between $Sr(OH)_2$ and $H_2SO_{4(aq)}$? Explain.

3. Which of the following substances is a strong electrolyte in aqueous solution?
NaCl CH_4 H_2O CO CCl_4

4. A 25.00mL sample of an aqueous solution of $Ba(OH)_2$ requires 18.45mL of 0.01500M $HCl_{(aq)}$ for its neutralization. What is the molarity of the $Ba(OH)_2$ solution?

5. Write net ionic equations for the following acid-base reactions:
   a. The strong base KOH and the weak acid $HC_2H_3O_2$.

   b. The strong base barium hydroxide and the strong acid perchloric acid.

   c. The weak base methyl amine (CH_3NH_2) and the strong acid hydrobromic acid (HBr).

6. What is the molarity of a solution of hydroiodic acid if exactly 35.0mL of .010M lithium hydroxide is required to titrate 30.0mL of the acid solution to the equivalence point?

7. Classify each (unbalanced) reaction as precipitation, acid-base neutralization or oxidation-reduction. Write a net ionic equation where possible.

a. $Mg_{(s)} + Cl_{2(g)} \rightarrow$
b. $Ba(OH)_{2(aq)} + H_2SO_{4(aq)} \rightarrow$
c. $Cu(NO_3)_{2(aq)} + Zn_{(s)} \rightarrow$
d. $Na_2CO_{3(aq)} + Al(NO_3)_{3(aq)} \rightarrow$

8. In each reaction determine: a) the oxidation number of each element, b) which element is oxidized and which is reduced, c) the oxidizing agent and the reducing agent.

a. $4NH_3 + 6NO \rightarrow 5N_2 + 6H_2O$
b. $2LiI + F_2 \rightarrow 2LiF + I_2$

9. A 100.g sample of an unknown alkali metal sulfate compound is dissolved in water. When excess barium nitrate is added, 164.31g of insoluble barium sulfate is produced. What is the identity of the original sulfate compound?

10. How many milliliters of a 3.85M solution of Fe^{2+} are needed to titrate 250.0mL of a 0.125M CrO_4^{2-} solution (in acidic solution)?
$H^+ + CrO_4^{2-} + Fe^{2+} \rightarrow Fe^{3+} + Cr_2O_3 + H_2O$ (not balanced)

11. Determine the net ionic equation for the reaction between aqueous $Sr(OH)_2$ and $FeSO_4$ solutions.

12. What is the oxidation number of iron in Fe_3O_7?

13. When the following half reaction (unbalanced) occurs, determine the total number of electrons transferred.

$Br_{2(aq)} \rightarrow BrO_3^-{}_{(aq)}$

14. A person's blood alcohol (C_2H_5OH) level can be determined by titrating a sample of blood plasma with a potassium dichromate solution. The balanced equation is
$16H^+_{(aq)} + 2Cr_2O_7^{2-}{}_{(aq)} + C_2H_5OH_{(aq)} \rightarrow 4Cr^{3+}_{(aq)} + 2CO_{2(g)} + 11H_2O_{(l)}$
If 35.46mL of 0.04961M $Cr_2O_7^{2-}$ is required to titrate 25.00g of plasma, what is the mass percent of alcohol in the blood?

15. Pb falls below Zn on the activity series of metals. Determine if there will be a reaction when a piece of solid zinc is placed into a solution of lead(II)nitrate.